

Summary of: The use of flumazenil after midazolam-induced conscious sedation

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VERIFIABLE CPD PAPER

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Objective To investigate the use of flumazenil after midazolam-induced conscious sedation. **Design and setting** A prospective audit was carried out in the Department of Sedation and Special Care Dentistry at Guy's Hospital, King's College, London, 2009. **Subjects** Patients sedated with midazolam for dental treatment. **Method** All clinical staff completed the data capture proforma when flumazenil was administered to a patient after sedation with midazolam. **Results** Four hundred and fifty-three patients were sedated with midazolam. Flumazenil was used in 32 cases. No cases required flumazenil for the emergency treatment of respiratory depression. **Conclusions** The results of the audit confirmed the safe and appropriate use of midazolam for conscious sedation within the Department of Sedation and Special Care Dentistry at Guy's Hospital and demonstrated that flumazenil use was low and in accordance with current best practice. The audit has highlighted distinct indications for the post-operative use of flumazenil in specifically selected cases. Each case should be individually considered, justified and documented within the patient's clinical record.

EDITOR'S SUMMARY

Newton's Third Law of Motion states that 'To every action there is an equal and opposite reaction' and although I am cheating hugely by quoting it here, the purpose is to emphasise that for every decision taken, especially in clinical or therapeutic care, there are inevitable chains of consequences.

In this instance the starting point was the decision by the General Dental Council in the late 1990s to bring to an end the use of general anaesthesia (GA) in 'high street' dental practices. Brought about in particular following unfortunate cases of deaths under such circumstances, notably to young children, the ruling set up an immediate change in the provision of GAs to dedicated centres only, with a concomitant temporary confusion of who could do what, when and a steep increase in waiting times and referral backlogs.

Another consequence has been the rise in conscious sedation as a technique to help alleviate the anxiety that various types and groups of patients experience

with dental treatment. However, this in Newton's turn has created problems of its own as midazolam, one of the drugs used routinely for conscious sedation can take some time from which to recover. An apparently neat way out of this is to inject the 'antidote' solution in the form of flumazenil. But, wait for it, this agent also has its limitations, side effects and consequences for patient care.

This research is therefore an important step forward in the creation of safe and effective guidelines, as are the other reports highlighted within the paper, which provide a research-based set of checks and balances with which to buffer the 'equal and opposite' reactions. Patient safety was the consideration at the beginning of this sequence of events and remains of cardinal importance over and above time and money. Having written that, it is also pleasing to note that the shift from GAs to sedation has also had beneficial effects of developing other techniques for groups such as patients with learning difficulties for whom our extra care is always required.

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 209 issue 11.

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IN BRIEF

- Identifies distinct indications for the post-operative use of flumazenil in specifically selected cases.
- Demonstrates the safe and appropriate use of midazolam and flumazenil for conscious sedation.
- Makes recommendations about the administration of flumazenil and discharge of patients who have undergone midazolam-induced conscious sedation for dental procedures.

COMMENTARY

This is an important study due to the fact that all dental services providing conscious sedation are required to regularly audit their use of flumazenil. The NPSA's rapid response report *Reducing risk of overdose with midazolam injection in adults* in 2008 made several recommendations including: 'Do not rely on flumazenil to reverse oversedation by midazolam – it carries its own risks – but rather aim to prevent oversedation in the first place, however, if you need to use flumazenil, audit its use.' These findings from a large cohort of patients in this prospective audit provide a standard for comparison for other studies. There is very little specific advice available on use of flumazenil for prolonged recovery and this study provides a useful guide for its appropriate use. It standardises methods of use which vary even between clinicians at one site.

It is important to record the time of administration of the last increment of midazolam at the induction of sedation. Prolonged recovery should be considered to be more than 45 minutes after this endpoint.

The other selected cases that were most commonly reversed were people with learning disabilities. This group of patients can be unpredictable during recovery, especially if they do not have verbal communication. Some will try and get out of the chair, others will try to remove the canula before they have fully recovered and, as a consequence, the IV access is lost. In addition, some will have prolonged recovery and be

difficult to rouse. Therefore, this group of patients may be reversed to manage agitated behaviour or aid safe physical transfer of the patient.

It is helpful to involve carers and/or family members who will help assess recovery. It is even more difficult to assess recovery if an individual has a physical disability as well as a learning disability and uses a wheelchair.

It would be useful to know the dose of midazolam and whether any of these patients had oral or intranasal midazolam beforehand.

The other unknown in the process of reversal with flumazenil is the period of time post administration. This group of clinicians waited an average of 17.5 minutes post flumazenil administration until discharge.

The use of flumazenil as an intranasal administration, in one case where intravenous access had been lost, is particularly interesting and a useful suggestion in these circumstances. Further research into this method of flumazenil administration is recommended.

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AUTHOR QUESTIONS AND ANSWERS**1. Why did you undertake this research?**

A previous audit revealed the type of problems encountered during conscious sedation. 46% of postoperative problems were due to 'delayed recovery' and of these 38% of patients were administered flumazenil to enhance recovery.

The audit was carried out to identify the reasons for elective (non-emergency) administration of flumazenil and to establish what clinicians understood to be 'delayed' or 'prolonged' recovery following conscious sedation with midazolam. Following the NPSA rapid response report *Reducing risk of overdose with midazolam injection in adults* (December 2008) the decision was made to carry out an audit of the use of flumazenil after midazolam-induced conscious sedation in the Department of Sedation and Special Care Dentistry.

2. What would you like to do next in this area to follow on from this work?

Limited research into the safety of flumazenil is available. The literature review revealed that there is concern over the routine administration of flumazenil to reverse conscious sedation with midazolam. Patients should be allowed to recover for a sufficient time to cover the redistribution half-life clearing period of the drug, but should also be discharged under the responsibility of an adult escort.

It would be interesting to investigate the incidence of any adverse effects experienced by patients following reversal of midazolam-induced conscious sedation with flumazenil and to consider the time and the cost implications for its use as a reversal agent.